SPECIFICATION

TITLE OF THE INVENTION:

COMBINATION ILLUMINATING INVERSE FUNCTION POWER INDICATOR AND A BRAKE LIGHT

CROSS REFERENCE TO RELATED APPLICATIONS
(Not applicable)

Background of the Invention

01. This invention relates to automotive lighting systems and signals, and more particularly to automotive lights and illuminating signals visible to a driver of a following vehicle.

02. Description of the Prior Art.

03. The use of a myriad of motor vehicle safety lighting signals and systems is known in the prior art. However rear end collisions have always been and continue to be a major driving hazard regardless of all prior art and the efforts of all automotive regulatory agencies. Automotive manufactures have improved the visibility and placement of present day illuminated automotive signal lights, however as most motor vehicle drivers have experienced, the brake lights of a lead vehicle, regardless of how visible they are, can illuminate with no advance warning or reason visible to a following vehicle driver. Even if a driver of a following vehicle is maintaining a reasonable following distance between his vehicle and a lead vehicle, many factors influence the reaction time of the following vehicle driver to the red brake light indication of the lead vehicle. There are many examples of inventive means disclosed in the crowded prior art intended to mitigate the danger of motor vehicle rear end collisions.

03. A first example is U.S. Pat. No. 3,676,844 issued to Hendrickson on July 11, 1972 that discloses an automotive vehicle signal light warning method that signals two conditions to a following vehicle driver to wit: the under power and not under power condition of the vehicle.

a. Bartilucci, in U.S. Pat. No. 5,663,707, issued Sep. 2, 1997, discloses signal lights of green, red, and yellow light emitting diodes, visible through a rearview window of a vehicle, and operated by electrical signals from a vehicle accelerator pedal, brake pedal, transmission, and turn signals.

b. U.S. Pat. No. 3,846,748, issued to Hopwood on Nov. 5, 1974, discloses a signaling system and sensor comprised of a mercury switch sensitive to acceleration, deceleration, and constant motion with associated signaling lights to indicate acceleration or deceleration of a vehicle.

c. Arnold, in U.S. Pat. No. 6,486,744 issued Nov.26, 2002, discloses a vehicular deceleration warning system that includes an accelerator pedal pressure sensor and a visual signal means.

d. U. S. Pat. No: 4,970,493, issued to Yim on Nov. 13, 1990, discloses a lighting system for a motor vehicle with electrical switches that can be removably attached to the accelerator and brake pedal; pressure on said accelerator pedal illuminates a green light and removal of said pressure lights an amber light.

e. Francis, in U.S. Pat. No. 5,663,706, issued on Sep. 2, 1997, discloses an automotive alert system with a rearward facing light that illuminates when both the brake pedal and accelerator pedal are released.

05. However, none of the above-cited references, taken in whole or in part, anticipate, render obvious, suggest or even implies the concept of this new, novel, and unique combination illumination device comprised of an inverse function illuminating engine power indicator and a brake light.

SUMMARY OF THE INVENTION

06. A first embodiment of this instant invention is an illumination device intended for automotive use that combines an inverse function illuminating engine power level

indication and a standard brake light indication. The illuminating engine power level indication is inverse because it displays an increase in illumination corresponding to a decrease in the monitored or measured engine power, with a maximum of light displayed indicating a minimum of engine power. Alternately, the engine power monitor function of the combination illumination device displays decreasing amounts of illumination with increasing amounts of the monitored engine power.

07. The illuminating display of choice for this combination engine power meter and brake light is a segmented horizontal display, although a segmented display in a circular, rectangular, or other shape could be used. An electronic circuit with an analog dc voltage input from a throttle position sensor controls the power display function of this combination-illuminating device, said circuit allows for adjusting and setting a top of range power point and a bottom of range power point. The top power point is that selected engine power level above which there is no illumination of the display segments, and below which the display starts illuminating. As engine power decreases below the top selected point the center segment of the display illuminates. A first incremental decreases in engine power below that point causes the second segments, segments on both sides and adjacent the center segment, to illuminate. A second incremental decrease in engine power causes the third segments, segments on both sides and adjacent the second segments to illuminate. This process repeats until the power level decrease to or below the bottom of range selected and adjusted power point. At or below the bottom selected power point all segments of the segmented power function display are illuminated.

08. The electronic circuit provides for different values of resistance in series with the display segments. The different values of resistance cause the center display segment to illuminate at a relatively dim or decreased value of illumination. The second segments on both sides of the center segment illuminate at a noticeable increase in illumination relative to the center segment, and the third segments on both sides of the second segments illuminate at a higher value of lumens relative to the second segments, and so on, until the final segments of the left and right ends of the display illuminate at a level just noticeably below that of illuminated brake lights.

09. The electronic circuit also provides time delays between the illumination of the center segment and the transcending pairs of segments. These time delays are provided so that a human eye can see the increasing or decreasing illumination of the display in defined steps at a time when engine power is abruptly changed from high to low, or low to high. The electronic circuit also causes the brake light function of the combination illumination device to have priority over the engine power function of the device. A brake circuit voltage input to said electronic circuit causes the engine power level indication function to cease, and causes all segments of the display to illuminate at full brake light intensity simultaneously, until the brake light voltage input is removed from said electronic circuit. Removal of the brake light circuit input allows the illuminating display to once again display engine power level.

10. A second embodiment of this invention is an illuminating device comprised of multiple rows of illuminating segments, with one or more rows of segments dedicated to operate as a combined engine power and brake light, and one or more rows of segments dedicated to function as a combination park light and left and right turn signals. A brake light function, with primary priority over the engine power level function, would illuminate the rows of segments used for engine power indication as a brake light when the vehicle brakes are applied. A directional light function, with secondary priority over the power level function, would cause the power level function to cease operation so long as a turn is signaling, and the brake is not applied. If the brake is applied at the same time a turn is signaling, the row or rows of segments that display engine power would illuminate as a brake light and the row or rows of segments dedicated as combination park and directional lights would operate as a directional light on the signaled side and as a park light on the non signaled side.

11. A third embodiment of this invention is an illuminating device comprised of one or more rows of illuminating segments comprising an illuminating segmented display that varies the amount of illumination as an inverse function of engine power, where the amount of illumination decreases as a function of increasing engine power, and where the amount of illumination increases as a function of decreasing engine power.

A maximum of illumination is displayed at a selectable minimum engine power point, and a minimum of illumination is displayed a selectable maximum engine power point. No illumination is displayed above the set maximum engine power point. An electronic circuit that is part of the illuminating device controls the illumination of the display segments as a function of a dc analog voltage input from a vehicle throttle position sensor.

BRIEF DESCRIPTION OF THE DRAWINGS

12. Fig 1 is a front view of a first embodiment of the invention with a typical electronic control circuit.
13. Fig. 2 is a view of a typical electronic control circuit for a second embodiment of the invention.
14. Fig. 3 is a front view of a third embodiment of the invention with a typical electronic control circuit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

15. The present invention is an illuminating device for use on a motor vehicle. The first embodiment of the invention, as disclosed in Fig.1, is comprised of an inverse function illuminating engine power indicator combined with a break light. A dc voltage from a vehicle throttle position sensor is input to the electronic circuit at 10, conducts through the normally closed side of contact 20 to input pin 5 of dot/bar display drivers 16 and 17. Potentiometer R1 at 22 is adjusted for a selected high-end voltage to be applied at the top end of an internal voltage divider in second bar/dot driver 17. Variable resistor R4 at 24 is adjusted for a low-end voltage and applied to the low end of the internal voltage divider in first bard/dot driver 16 at pin 4. The high end of the voltage divider in first bar/dot driver 16 at pin 6 is connected to the low end of bard/dot driver 17 at pin 4, electrically connecting the voltage dividers of bar/dot drivers 16 and 17 in series. The selected high and low end voltages applied to bar/dot drivers 16 and 17 determine the input voltage range that will operate the ten

driver outputs each of bar/dot drivers 16 and 17. The outputs of drivers 16 and 17 are connected to the anodes of the light emitting diode loads, (herein after LEDs), between the current adjusting resistors 9 and LEDS 8. This connection causes the outputs of the bar drivers to switch the LEDs to on with no input, or a low input on pin 5 of bar dot drivers 16 and 17. As the input voltage at 10 increases above the selected low end voltage of bar driver 16, the first output of driver 16 at pin 4 is switched to on, and LEDs 20 A&B on the left and right end of display 25 are de-energized. Increasing input voltage at 10 will turn off the LEDs in sequence from a first and a second end of display 25, working in to the center of display 25. Input voltage 10 above the high-end set-point voltage 22 will turn on all outputs of drivers 16 and 17 and turn off all LEDs in display 25. Decreasing the dc input voltage at 10 down to the top of range set point will turn off the top display driver output pin 10 of bar/dot driver 17 illuminating the center segments of display 25. Further decreases in input 10 voltage will turn off more bar/dot driver 17 and 16 outputs and illuminate more display segments adjacent both sides of the center display segment.

16 Automotive break circuit voltage applied to relay K1 at 7 would energize K1 and operate first form "C" contact 20. Operation of form "C" contact 20 will remove the throttle position sensor voltage from dot/bar driver inputs 5 and connect said inputs 5 to system common 6. Connection of dot/bar driver input pins 5 to system common 6 would de-energize all bar driver outputs from 16 and 17 and illuminate all LEDs 8 in the display simultaneously. Operation of the second form "C" contact 19 of relay 18 will change the dc voltage supply to the LEDs at 11 and 12 from V3+(5 vdc) to V2+ (7 vdc) illuminating all LEDS in display 25 at full or brake light intensity.

17 The second embodiment of the invention is disclosed in Fig. 2. Two horizontal rows of LEDs with series current limiting resistors are depicted one above the other. The lower row of LEDs is operated as a combination inverse function engine power indicator and brake light. During non-braking conditions vehicle power 68 conducts through the normally closed side of form C contact 32 to voltage regulator E6 at location 33. The 5-vdc output from E6 conducts though the normally closed contact

of relay K5 at location 67 to the positive side of said lower row of LEDs. Throttle position sensor voltage is conducted through the normally closed side of form C contact 20 to input pins 5 of dot/bar drivers 42 and 43. The internal voltage dividers of dot/bar drivers 42 and 43 are connected in series. The low end of the voltage operating range of the series dot/bar drivers is adjusted by variable resistor R12 at location 60 and connected to pin 4 of bar driver 42. The high end of the voltage operating range is adjusted by potentiometer R9 at location 61 and connected to bar driver 43 at pin 6. In put voltage from the throttle position sensor to pins 5 of bar drivers 42 and 43 that is above the adjusted low end voltage, and below the adjusted high end voltage, will operate the bar driver outputs and illuminate the LEDs. Operation of the vehicle brake circuit will energize relay K2 at location 31 and disconnect input pins 5 of bar drivers 42 and 43 from the throttle position sensor input voltage and connect said input pins 5 to circuit common 69. Circuit common connected to the inputs of bar drivers 42 and 43 will switch off all bar driver outputs and illuminate all lower row LEDs. Also contact 32 of relay K2 operates, disconnects vehicle power from regulator E6 at location 33, and connects said power to regulator E5 at location 34. The 5-vdc output of E6 is replaced by the 7-vdc output of E5 and connected to the positive side of the lower row of LEDs to increase the illumination of said lower row of LEDs to that of brake lights. Operation of either left or right turn signal will energize relay K5 at location 67 and open the normally closed contact 70. Opening contact 70 will inhibit illumination of this lower row of LEDs operating in the power indication mode. Opening contact 70 during brake light function mode will not inhibit said brake light function.

18. The upper row of LEDs function as a combination park light and directional signal lights. During non-directional signal operation conditions 5 vdc is supplied to the anodes of all LEDs in the upper row. If a left or right turn is signaled the 5 vdc on the signaled side of the display is replaced by 7 vdc and the signaled side operates as a stepped sequence illuminating from the center to the outer illuminating segment during each signal pulse of voltage on said signaled side. The opposite side continues to illuminate in the park light mode. Also if the lower row of LEDs is

operating in the power display mode it will be inhibited during turn signal operation of the upper row of LEDs.

19. Park light function of the upper row of LEDs is accomplished by conducting positive vehicle battery voltage through the normally closed side of form C contact 50 as input to display left side bar driver 53, and through the normally closed side of form C contact 57 to the input of right side bar driver 54. Plus 5 vdc is conducted through the normally closed side of contact 51 of relay K3 at location 49 to the anodes of the LEDs on the left half of the upper row of the display at 36, and through the normally closed side of form C contact 56 to the anodes of the LEDs of the right half of the upper row of the display at 39. With positive battery as input to pins 5 of bar drivers 53 and 54, all bar driver outputs are switched on and all LEDs in the upper row illuminate at park light intensity.

20. When the first left turn signal positive voltage pulse is applied at 63, it conducts through diode D1 charging capacitor C1 at location 62, and energizing relay K3 at location 49. The discharge of C1 through the coil of K3 maintains K3 in an energized state between turn signal voltage pulses. Form C contact 50 operates removing positive battery from input pin 5 of bar driver 53, and replaces it with a positive left turn directional signal voltage pulse. The positive left turn signal voltage pulse on input pin 5 of bar driver 53 will cause the outputs of bar driver 53 to switch on, beginning with output one which is connected to the left center LEDs C1 A&B, and ending with output ten which is connected to left end LEDs C10 A&B. At the end of the left turn signal voltage pulse the left side display illumination will extinguish until the next left turn signal voltage pulse restarts the illuminating sequence. The second form C contact 51 of relay K3, location 49, operates and switches the anode supply voltage of the LED display left side from positive 5 vdc to positive 7 vdc increasing the illumination intensity of the left side of the display during operation of the turn signal function. Removal of left turn signal positive voltage pulses from 63 de-energizes relay K3 location 49, reconnecting battery positive to input pin 5 and allowing the LEDs anode supply voltage to change from plus 7 vdc back to plus 5 vdc thereby returning the left side of said display to the park light function.

21. When the first right turn signal positive voltage pulse is applied at 64, it conducts through diode D2 charging capacitor C2 at location 71, and energizing relay K4 at location 55. The discharge of C2 through the coil of K4 maintains K4 in an energized state between turn signal voltage pulses. Form C contact 57 operates removing positive battery from input pin 5 of bar driver 54, and replaces it with a positive right turn directional signal voltage pulse. The positive right turn signal voltage pulse on input pin 5 of bar driver 54 will cause the outputs of bar driver 54 to switch on beginning with output one, which is connected to the right side center LEDs D1 A&B, and ending with output ten which is connected to right end LEDs D10 A&B. At the end of the right turn signal voltage pulse the right side display illumination will extinguish until the next right turn signal voltage pulse restarts the illumination sequence. The second form C contact 56 of relay K4 location 55, operates and switches the anode supply voltage of the LED display right side from positive 5 vdc to positive 7 vdc increasing the illumination intensity of the right side of the display during operation of the turn signal function. Removal of right turn signal positive voltage pulses from 64 de-energizes relay K4 location 55, reconnecting battery positive to input pin 5 and allowing the LEDs anode supply voltage to change from plus 7 vdc back to plus 5 vdc thereby returning the left side of said display to the park light function.

22. Fig.3 depicts a third embodiment of the invented inverse function illuminating power meter 82 with a typical operational electronic circuit. This description is of an illuminating inverse power meter and operates to wit: An output dc voltage from a throttle position sensor is input to this circuit at 87. Said dc voltage conducts to input pins 5 of dot/bar drivers 85 and 89. The bar driver outputs 95 of bar driver 85 are connected to the left side LEDs at L, location 93, and the bar driver outputs 96 of bar driver 89 are connected to the right side LEDs at M, location 94. Variable resistor R24 at location 92 is adjusted for the low end of the operating range and connected to the first bar driver 85 at pin 4. The high end of range is adjusted with potentiometer R27, location 90, and connected to the second bar driver 89 at pin 6. Input voltage at or below the adjusted low end of range will illuminate all LEDs of the display. Input voltage increases above the low-end set point will extinguish LEDs of the display

beginning with the left and right outermost LEDs 20A and 20B and work toward the center of the display. Input voltage at or above the high-end set point will extinguish the center display LEDs 1A and 1B, and all LEDs of the display. Voltage regulator E10 at 83 supplies 7 vdc to the anodes of display 82 LEDs, and regulator E11 at 84 supplies 5vdc to the dot /bar drivers 85 and 89. Battery common is supplied to all components of the circuit at 88. J at 80 and K at 81 indicate the illuminating elements of left and right halves of display 82. R28 at 86 is a required load current adjusting resistor for dot/bar driver 85.